Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PAPERS

IN

AGRICULTURE.

The THANKS *of the Society were this Session voted to the Right Hon. the* EARL OF FIFE, *for the following Communication received from him relative to his Plantations.*

SIR,

I REQUEST you will lay this letter before the Society for the Encouragement of Arts, &c. as I feel it my duty to convey any information to them, respecting my plantations from the grateful sense of the honour they have done me. I have continued every year since I last wrote to the Society, to plant above one hundred acres: my plantations now, in the counties of Banff, Aberdeen, and Murray, amount to above thirteen thousand acres. I have always recommended to planters to be very sparing in pruning trees.

I have the pleasure to observe, that on the highest grounds in Duff-House Park, even where exposed to the sea, by cutting down firs and other trees, where they interfere with each other, that the oaks and other close-grained timber trees, rise vigorous and healthy, and will be very valuable, the oaks in particular. The silver fir and larch also grow to a great size. I was under the necessity of cutting down two silver firs and larches, where they prevented the growth of other trees; I directed them to be sawed up.—The boards of the larch have been made into tables, and are very handsome. Those of the silver fir have been used as flooring to two rooms in Delgany Castle, where the fir had decayed, and are remarkably white and finely polished. The trees in question were about forty years old.

There was a very high wind the 25th of December last, which blew down a great many trees upon my estate. Particularly a silver fir in the woods on the low grounds near Duff-House, which appeared to be well sheltered. It was planted by me in the year 1756, and had a most venerable appearance. The dimensions were as follow, as attested to me, viz.

	Ft.	In.
Length of the trunk from the surface of the ground, until divided in five limbs - - -	7	0
Girth at surface of ground - -	9	7
Girth immediately below where the limbs set off - -	8	6
The five limbs are all of the same height, except No. 1, which divides into two branches before it reaches the top. These are only a few inches shorter than the others, which are 42 feet 6 inches from where they leave the trunk, whose length is 7 feet, therefore, when added together to the height of the tree, is - - - -	49	6
No. 1. Measure of girth, where it sets off from the trunk -	5	3
And at the distance of 8 feet divides itself into two large branches.		
No. 2. Girth where it sets off from the trunk -	4	0
And at the distance of 23 feet 4 inches from starting, measures 2 feet.		
No. 3. Girth at starting - - -	3	10

This, and the two other branches, No. 4 and 5, gradually decrease towards the top.

	Ft.	In.
No. 4. Girth at starting from trunk - -	3	7
No. 5. Girth at ditto ditto - - - -	3	3

The tree alluded to has a great deal of wood in it, which I have ordered to be manufactured for different purposes. There are pineaster larger, but their wood I conceive not to be so fine. The other trees are thriving and well-fenced. Little trouble is occasioned by keeping the fences in repair. I do not recommend the planting of acorns, but rather procure them from nurseries, at two or three years old.

I think seedling larch thrives best when planted in moors, and this also thins the seed beds, from which so many may be taken and transplanted into nurseries, and planted out the second year after.

I raise very few Scotch firs, as I buy them from nurserymen, at ten-pence per 1200. I continue to have nurseries of all the different hard woods, near my plantations, and which I find answer better than what are purchased from nurserymen. In general they are planted too near each other in their nurseries, and not being removed in time, the roots are seldom so good, which I think I have stated in my former letters.

I am, Sir,
Your most obedient humble servant,

FIFE.

London, Fife-house, 28th June, 1807.

To C. Taylor, M. D.
Secretary to the Society of Arts, &c.

The SILVER MEDAL *of the Society was this Session voted to* DAVID DAY, *Esq. of West-hill, near Rochester, for his Plantations of Ash Trees, and his interesting Remarks on the Advantages derived from them.*

IN the first volume of the Society's Transactions for 1783, page 109, will be found a detailed account of the experiments which Mr. Day had made to the years 1779 and 1780 in planting Ash trees ; the present account points out their subsequent management.

Mr. Day has deposited with the Society a minute account of the expenses to which the following statements refer, and which may be inspected at the Society's house.

SIR,

IF you think the following information, relative to my plantations of ash trees, likely to be of advantage to the public, I wish you to lay it before the Society of Arts, &c. The Rewards I received from the Society have stimulated me to exertions in this line, and I have been very successful. I have declined all business but that of raising ash trees for my own amusement, and for improvement of the landed interest; and I flatter myself that I know it as well as any man in the kingdom. I am so certain of the success attending ash plantations, that I am willing, on landed security being given me, to advance any sum as far as thirty thousand pounds, on having the execution of such improvements under my own inspection, either jointly, or on the owner's account. I have travelled over a considerable part of England, and was sorry to see such a waste tract of land as Bagshot Heath, when I know it might be improved by cultivation or planting, as has really been done at Farnham, and many other commons in the kingdom. Where there are, at present, wild or uncultivated woods, I would recommend to grub up the old wood, and either put the land in tillage, or plant it properly with fresh wood, which would produce four times as much both in timber and underwood.

I have made from the underwood of some of my plantations 94*l.* per acre, at only ten years growth, and I am now falling some plantations, of which the underwood alone will produce me 150*l.* per acre, exclusive of the expense of falling. It cannot be expected that noblemen or gentlemen, brought up in expectation of possessing large estates, can have a knowledge of improvements like the executive man, and they are deterred from them by the impositions they meet with in attempting their execution. Few servants will exert themselves properly in improvements without having an interest in it themselves: But my plan is no speculation; I know from long experience it will yield an ample profit to the persons who engage in it with attention. When the plantations are once put in order, they require but little to be done afterwards, and, therefore, are good estates for parents to give their female children, as the wood will always find its value from the buyers, when ready for falling, without any trouble or expense to the owner.

I am, Sir,

Your obedient servant,

DAVID DAY.

West-hill, near Rochester, April 23, 1806.

To C. Taylor, M. D. Sec.

Account of two acres of land in the parish of Chalk, planted with Ash, in the year 1763.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1766	33	0	0	By produce in 1776	42	0	0
Expenses to 1793	53	19	1	By ditto in 1783	40	0	0
Balance of profit in 1793 .	135	1	8	By ditto in 1793	107	0	9
£.	189	0	9	£.	189	0	9

N. B. In 1806, *the above Plantation was again fallen, and the Produce sold for* 50*l. per Acre, but it was worth considerably more. The Shoots are now in a very flourishing state.* [July, 1807.]

Account of two acres of land in Maggot's Wood.

Expenses to 1780	28	16	0	By produce in 1780	54	8	0
Expenses to 1792	30	0	0	By ditto in 1792	100	0	0
Expenses to 1799	22	3	8	By ditto in 1799	180	13	0
Balance of Profit in 1799	254	1	4				
£.	335	1	0	£.	335	1	0

N. B. It is now eight Years since the last Fall, and the Crop of Ash, in its present state, is worth 90*l. per Acre.*

Account of one and a half acre of land next Brompton Farm, in the parish of Frindsbury.

Expenses to 1783	4	16	3	By produce in 1783	42	8	0
Rent for 9 Years	10	16	0				
Expenses to 1794	20	19	0	By produce in 1794	115	19	6
Balance of profit in 1794	121	16	3				
£.	158	7	6	£.	158	7	6

N. B. In 1806, *was again fallen, and the Produce sold for* 50*l. per Acre, and the present Crop in an excellent state.*

Account of seven acres of land, at Longfield, in the parish of Higham.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1784	9	6	9	By produce in 1784	£. 130	1	6
To ten years rent	22	0	0				
Balance of profit in 1784	98	14	9				
	£. 130	1	6				

N. B. This Land has not been in my Hands since 1798, *and is now in a neglected state from bad Management, and from the Fences being broken down, and the Plants damaged by Cattle.*

Account of six acres of land at Stonefield, in the parish of Frindsbury, planted with Ash and Chesnut trees.

Expenses to 1790	4	19	0	By produce in 1790	44	3	9
To rent 14 years	67	4	0				
Expenses to 1799	55	19	0	By produce in 1799	140	5	0
Balance of profit in 1799	56	6	9				
	£. 184	8	9		£. 184	8	9

N. B. This Land has not since been in my Hands; the Chesnuts are now in a flourishing state, but the Ash much neglected.

Account of six and a half acres of land at Frenchill, in the parish of Shorn—planted 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1786	9	7	5	By produce in 1786	91	9	6
To rent for 9 years	46	16	0	By produce in 1799	163	2	0
Expenses to 1799	90	6	3				
Balance of profit in 1799	108	1	10				
	£. 254	11	6		£. 254	11	6

N. B. This Land is in my Possession, and the Crop in its present state is worth 50*l. per Acre.*

Account of a quarter of an acre of land in the parish of Shorn—planted with Ash.

Expenses to 1786	1	0	6	By produce in 1786	8	13	6
To nine years rent	1	11	6				
Expenses to 1801	10	6	10	By produce in 1801	31	16	6
Balance of profit in 1801	27	11	2				
	£. 40	10	0		£. 40	10	0

N. B. In four Years time this Crop will be worth considerably more than the last falling.

Account of five acres of land at Commonfield, in the parish of Shorn—planted with Ash in 1777.

Expenses to 1788	10	11	2	By produce in 1788	165	0	6
To 11 years rent	44	0	0				
Expenses to 1800	90	2	2	By produce in 1800	480	15	5
Balance of profit in 1800	501	2	7				
	£. 645	15	11		£. 645	15	11

N. B. In three Years time, this Crop will be worth more than the last fall.

Account of a quarter of an acre of land, called Pompfield, in the parish of Shorn—planted with Ash in 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses & rent to 1789	2	0	1	By produce in 1789	8	10	6
Expenses to 1801	10	1	6	By produce in 1801	23	14	6
Balance of profit in 1801	19	14	5				
	£. 32	5	0		£. 32	5	0

N. B. In four Years the Produce will be worth more than the last Crop.

Account of eleven acres of land, called Piper's Acre, in the parish of Higham.

Expenses to 1790	44	13	9	Produce in 1790	72	1	0
Expenses to 1799	94	15	4	Produce in 1799	123	16	10
Balance of profits in 1799	56	8	9				
	£. 195	17	10		£. 195	17	10

N. B. This Land is in the Hands of a Farmer as a Tenant, and the Plants are much damaged from the Cattle being permitted to graze amongst them.

Account of two acres of land, called Seven Yards, in the parish of Higham—planted with Ash in 1780.

Expenses to 1790	7	7	9	Produce in 1790	£. 31	7	0
Balance of profit in 1790	23	19	3				
	£. 31	7	0				

N. B. This Land is not in my Hands; it afforded an excellent Crop in 1799, *and the Plants are now in a very flourishing state.*

Account of two acres of land, called Gad's Hill, in the parish of Shorn—planted in 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1802	48	16	4	Produce in 1802	108	15	3
Balance of profit in 1802	59	18	11				
	£. 108	15	3				

N. B. The present Crop is in a very flourishing condition.

Account of three quarters of an acre near my garden, in the parish of Frindsbury—planted with Ash in 1770.

Expenses to 1780	4	0	0	Produce in 1780	22	12	0
Rent ten years	6	0	0	Produce in 1798	71	14	6
Expenses to 1798	10	18	5				
Balance of profit in 1798	73	8	1				
	£. 94	6	6		£. 94	6	6

N. B. July 1807. *This Crop will next Year produce more money than the former Crop.*

Account of total profits on forty-six acres one rod of land, referred to in the above statement.

Acres.	Rods.					
2	0	at Chalk	from 1763 to 1793	135	1	8
2	0	Maggots	from 1769 to 1799	254	1	4
1	2	Brompton	from 1774 to 1794	121	6	3
		Carried forward		£. 510	9	3

Acres.

Acres.	Rods.	Brought up		£. 510	9	3
7	0	Longfield	from 1774 to 1784	88	14	9
6	0	Stonefield	from 1776 to 1799	56	6	9
6	2	French-hill	from 1777 to 1799	108	1	10
0	1	Robins's	from 1777 to 1801	27	11	2
5	0	Commonfield	from 1777 to 1800	501	2	7
0	1	Pompfield	from 1777 to 1801	19	4	5
11	0	Piper's Acre	from 1780 to 1799	56	8	9
2	0	Seven Acres	from 1780 to 1790	23	19	3
2	0	Gad's Hill	from 1777 to 1802	59	18	11
9	3	Near Garden	from 1770 to 1798	73	8	1
				£. 3525	5	9

SIR,

AGREEABLY to your request that I would furnish you with some further particulars, relative to my Ash plantations at the present period; you will find that I have added to each a N. B. with the state at the present day. I now send you some further remarks as you desired, relative to my mode of sowing the seed and managing the young plants.

Method of raising Ash Trees.

I carefully procure, from good straight well-proportioned ash trees, the ash keys, as they are commonly called, or pods, containing the seed, betwixt Christmas and the middle of February. Having, as soon as the ash keys are collected, prepared a hole in the ground, about three or four feet deep, I lay a bed of sand, a few inches deep, at the bottom of the hole; upon that I place a layer of ash keys, about two inches thick; these I cover with sand about the same thickness, to preserve the keys from heating,

ing, and then proceed with alternate layers of the keys and sand till the hole is full. They are suffered to remain in this state till the beginning of the month of March of the following year, when they should be taken out for sowing. The keys will be found in a swelled state, ready for vegetation. The land being properly prepared, drills should be made in it as for sowing peas, and the keys laid regularly therein, and covered up with earth.

In about six weeks the young plants will appear above ground, and should be kept perfectly clear from weeds by hoeing.

In the month of March, of the next year, they should be planted out in rows, a foot wide, and the plants placed three or four inches asunder in the row. In this state they are to remain for two or three years, when they will be in a proper condition for planting out into the land, where they are to remain.

For planting out where they are to remain, the land being previously well ploughed the preceding autumn, and a good loamy soil, not too wet or stiff, the ground is to be opened by the plough, into drills about two feet apart, and the plants placed in each other drill or row, so that the rows of ash are four feet apart, and the plants in the drill two feet asunder. The drills should be 10 or 12 inches deep. A man who sets the plants, places each upright in the drill, draws the earth to it with his foot, and treads it well in. Where a plant with a larger root than common is found, the man with a small hoe or picker makes a hole within the drill, a little deeper than usual, to hold the plant, but this is not often necessary.

A statute acre will contain 5400 ash plants, and one man can plant 1000 or 1200 plants in a day.

The intermediate row between the plants may be either set with beans or potatoes, or may be left open advantageously to serve as a drain to keep the young plants dry.

In the second year the plants should be stubbed or cut close to the ground with a bill; the produce serves for bavins or fire wood, and pays the expense of rent and cutting. From the stubs thus left in the ground the regular crops of ash are produced, and are fit for falling every ten years.

The ash plants are usually fallen betwixt Christmas and March, and the wood sorted into poles of three denominations; viz. best, second, and third hop-poles; besides stakes, edders, and bavins. The bavins will amply pay the expense of falling. The best hop-poles are worth, at present, forty shillings per hundred, the second quality twenty-five shillings, and the third, ten shillings. Stakes and edders are about two shillings and sixpence the hundred.

When the plants remain uncut for twelve or fourteen years, the ash plants are fit for other purposes, such as wood proper for wheelwrights, and broad hoops for coopers, besides hop-poles, &c. as before-mentioned.

When the plants have been two years in the nursery beds, and ready for planting out, they are worth from six shillings to ten shillings the hundred, according to their quality.

The ash plants I raised from 1763 to 1778, were	442484
I raised and sold from 1778 to 1807	156320
I have now ready for sale	126096
Total of the plants I have raised	724900

I will engage, provided the land is prepared by my directions, to plant ash for one-third less money than by any other mode of cultivation yet known, and for all plants that die in such a case, provided they are in new plantations, I will give plants gratis to replace them the succeeding year.

I am, Sir,
Your obedient servant,

DAVID DAY.

West-hill, near Rochester, July 31, 1807.
To C. Taylor, M. D. Sec.

The THANKS *of the Society were presented to Dr.* JAMES HOWISON, *for the following Communication on the Chinese Method of propagating* FRUIT TREES *by Abscission.*

The following Accounts were received from him, and an explanatory Engraving of the Method is annexed.

SIR,

THE Chinese, in place of raising fruit trees from seeds or from grafts, as is the custom in Europe, have adopted the following method of increasing them.

They select a tree of that species which they wish to propagate, and fix upon such a branch as will least hurt or disfigure the tree by its removal.

Round this branch, and as near as they can conveniently to its junction with the trunk, they wind a rope, made of straw, besmeared with cow dung, until a ball is formed, five or six times the diameter of the branch. This is intended as a bed into which the young roots may shoot. Having performed this part of the operation, they immediately under the ball divide the bark down to the wood, for nearly two-thirds of the circumference of the branch. A cocoa-nut shell or small pot is then hung over the ball, with

Pl. I.

Mr. J. Broad's Timber Gauge.

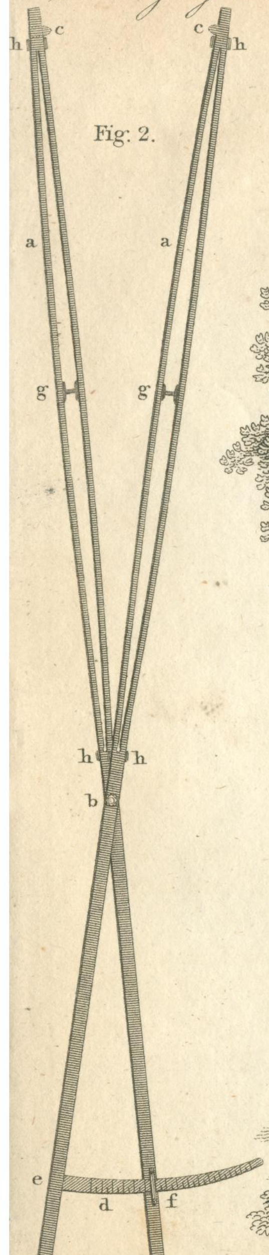


Fig: 2.

Chinese Method of propagating Fruit Trees by Absciſsion.

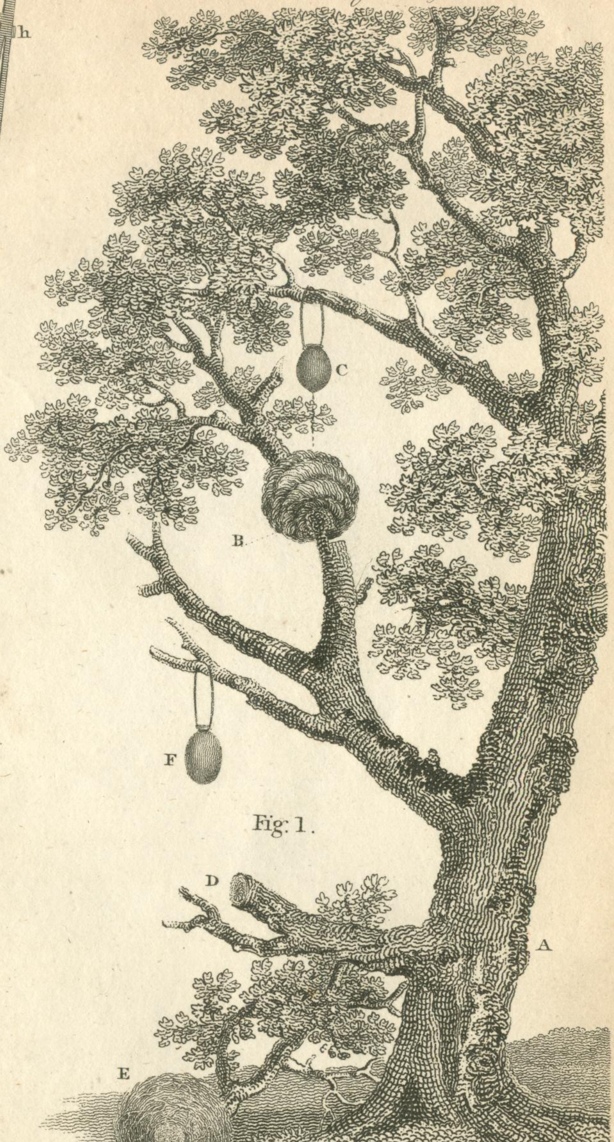


Fig: 1.

C. Varley del.

Miſs M. Ogilvy del.

S Porter sculp.

with a hole in its bottom, so small that water put therein will only fall in drops; by this the rope is constantly kept moist, a circumstance necessary to the easy admission of the young roots, and to the supply of nourishment to the branch from this new channel.

During three succeeding weeks, nothing further is required, except supplying the vessels with water. At the expiration of that period one-third of the remaining bark is cut, and the former incision is carried considerably deeper into the wood, as by this time it is expected that some roots have struck into the rope, and are giving their assistance in support of the branch.

After a similar period the same operation is repeated, and in about two months from the commencement of the process, the roots may generally be seen intersecting each other on the surface of the ball, which is a sign that they are sufficiently advanced to admit of the separation of the branch from the tree. This is best done by sawing it off at the incision, care being taken that the rope, which by this time is nearly rotten, is not shaken off by the motion. The branch is then planted as a young tree.

It appears probable, that to succeed with this operation in Europe, a longer period would be necessary, vegetation being much slower in Europe than in India, the chief field of my experiments. I am, however, of opinion, from some trials which I have lately made on cherry trees, that an additional month would be adequate to make up for the deficiency of climate.

The advantages to be derived from this method are, that a further growth of three or four years is sufficient, when the branches are of any considerable size, to bring them to their full bearing state, whereas, even in India, eight or ten years are necessary with most kinds of fruit trees, if raised from the seed.

When at Prince of Wales's Island, I had an opportunity of seeing this proved by experiment. Some orange trees had been raised by a gentleman, from seeds sown in 1786, which had not borne fruit in 1795, while branches taken off by the Chinese mode in 1791, had produced two plentiful crops.

Whether forest trees might be propagated in Europe in the same manner, I have not had experience sufficient to form a judgment: if it should be found practicable, the advantages from it would be great, as the infancy of trees would, by this means, be done away, a period which, from the slowness of their growth, and the accidents to which they are liable, is the most discouraging to planters.

The adoption of this method will, at all events, be of great use in multiplying such plants as are natives of warmer climates, the seeds of which do not arrive here at sufficient maturity to render them prolific.

I have frequently remarked that such branches of fruit trees as were under the operation of abscission, during the time of bearing, were more laden with fruit than any other part of the tree. It appeared to me probable, that this arose from a plethora or fulness, occasioned by the communication between the trunk and branches, through the descending vessels being cut off by the division of the back, while that by the ligneous circles or ascending vessels, being deeper seated, remains*. The same reasoning accounts for fruit trees producing a greater crop than usual, on being stripped of their leaves, most of the ascending juices being thrown off by them in perspiration, or expended in their nourishment, for we find that bleeding trees cease to give out their juices after they have put forth their leaves *.

---

* The circumstances attending the Chinese method of propagating fruit trees, appear a strong confirmation of Mr. Bonnet's opinion, that plants as well as animals have a regular circulation of their fluids.

I have observed that the roots from a branch under the operation of abscission, were uniformly much longer in shooting into the rope when the tree was in leaf, than the contrary, hence, the spring season appears most proper for performing that operation.

It will seem singular that the Chinese entertain the same opinion that Linnæus did, respecting the pith of trees being essential to the formation of the seed. By cutting into the trunk of the guava tree before it has produced, and making a division in the pith, they have obtained fruit without seed.

I am, Sir,
Your obedient Servant,

JAMES HOWISON.

London, June 4, 1806.
To CHARLES TAYLOR, M. D. SEC.

Reference to the Engraving, Plate I, *Fig.* 1, *of the Chinese Method of propagating Fruit Trees by Abscission.*

A. The tree on which the operation is performed.

B. The straw rope wound in a ball round a branch of the tree.

C. The cocoa-nut shell or vessel, containing the water, which gradually drops from thence on the ball below it.

---

* Marsden, in his History of Sumatra, page 119, says, "The natives, when they would force a tree that is backward to produce fruit, strip it of its leaves, by which means the nutritive juices are reserved for that important use, and the blossoms soon show themselves in abundance.

D. Another branch of the same tree from which the part E roosted in the straw rope or ball, and now ready for planting out, has been separated.

F. The vessel suspended from a branch above, and from which the ball had been supplied with water.

The SILVER MEDAL *was this Session voted to Mr.* JAMES BROAD, *of Downing Street, for his Invention of a Gauge or Measure for Timber.*

The following Communication was received from him; an Engraving of the Instrument is annexed, and a Model thereof is placed in the Society's Repository.

SIR,

THE Instrument I send herewith, is for finding the girth of standing timber, and will, I flatter myself, be found exceedingly useful to all gentlemen, and others having timber to dispose of, and likewise to such purchasers as wish to pay for the true quantity. At present a gentleman having timber to dispose of, is liable to be imposed on to a very large amount, for though some surveyors may be found whose eye is pretty accurate, yet that is far from being generally the case. When an estate is sold on which the timber is to be valued, I believe, there is no other way in general use of finding the girth of a tree (which being squared and multiplied by its length, gives the contents) than by actually getting up to the middle, where the girth is usually taken, with a ladder or otherwise: a method which is very troublesome and expensive where the quantity is large. The seller has, therefore, no way, but at an enormous expense, of finding the real contents of what he has to offer, and as the buyer, if a dealer from his knowledge, is able to form a more accurate judgment, it often happens that the seller sustains much loss. *I have known it exceed* 50 *per cent.* Having some time ago a large quantity to survey, I thought it possible to invent an instrument which would obviate this inconvenience, and which might be sold at a low price, be correct in its work, quick in execution, and such as any capacity might use. I likewise thought it might be so contrived as to make such an allowance for bark, as should be agreed on. The instrument I send you possesses all these qualifications, and is susceptible of several improvements, of which I was not aware when I made it, which I will point out at the end of my letter.

It is well known that the diameter and circumference of circles, are in a certain proportion to each other, and that double the diameter gives double the circumference. The allowance for bark is usually one inch in thirteen, that is, if the greater circumference of a tree with the bark on, is found to be thirteen inches, it is supposed it would be only 12 inches if the bark was taken off.

The instrument is composed of two straight pieces of well seasoned deal, about thirteen feet long, joined together by a pin going through them, on which they are moveable, but neither the length nor thickness are of any particular consequence, as by following the directions hereafter given, they may be made of any size. A little way from the larger end is a brass limb, I call the index, on which are engraven figures denoting the quarter-girth in feet and inches. To use this instrument, it is only necessary to take hold of the large end, and apply the other to that part of the tree where you wish to know the girth, opening it so wide as just to touch at the same time both sides of it, without straining it, keeping the graduated side of the index uppermost, on which the greater girth will be shown, after allowing for the bark, by the inner edge of the brass on the right hand leg. An operation so easy and simple, that a person of the meanest capacity might measure a great number of trees in a day.

For taking the height of a tree, I would recommend deal rods of seven feet long, made so as to fit into ferrils at the end of each other, tapering all the way in the same manner as a fishing rod. A set of five of them with feet marked on them, would enable a man quickly to measure a tree of more than forty feet high, as he would be able to reach himself about seven feet.

The improvements it is capable of, are, making a joint in the arch or scale, to enable it to shut up (when the legs are closed) towards the centre, which would make it easier to carry. Secondly, as it sometimes happens that standing timber is sold without any allowance for bark, and at other times with a less allowance than one inch in thirteen, two other scales on the index might be added in such cases, one without any allowance, and the other to allow as might be agreed on. I would have added these, but thought the Society would rather see it in the state in which it has been tried on a large survey, as any artist can with great ease add whatever scale he pleases. The present scale allows one inch in thirteen for bark, and is calculated on the following data. The diameter of a circle whose quarter circumference is 26 inches, is 33 $\frac{96}{100}$ inches. The diameter of a circle whose quarter girth is 6½ inches, is 8 $\frac{27}{100}$ inches. To graduate the scale, the instrument is opened so as to take in at the small end between the touching points 8 $\frac{27}{100}$ inches, and a mark is made on the arch to denote 6 inches quarter girth: it is then opened so as to take in 33 $\frac{96}{100}$ inches, and another mark is then made on the arch, to denote two feet quarter girth; (these marks are made close to the inner edge of the brass on the right hand limb): the space between them is then divided into eighteen parts, which represent inches, and are again divided into half, for half inches; if any notice is to be taken of quarter inches, the eye will easily make a further decision.

I beg leave to add, that it is not my intention to make any for sale.

I am, Sir,
Your obedient Servant,
JAMES BROAD.

Reference to the Engraving of Mr. James Broad's Machine for measuring standing Timber. Plate I, *Fig.* 2.

Fig. 2. *a a a a* Two long pieces of well-seasoned wood, joined near the middle by a pin *b* going through them, forming an axis on which they move. *c c* Two pieces of brass screwed near their upper ends, on the sides opposite to each other, and projecting over to form the measuring points. *d* The index fastened to one of the pieces of wood at *e*, and moving freely under a small bar at *f*. *g g* Screws with nuts, placed in the middle of the long slits of the two arms, to wedge them open, whereby the vibration is destroyed, and the arms, though light, are rendered stiff. *h h h h* Screws and nuts to prevent the arms from splitting.

No. 12, *Downing Street, Dec.* 8, 1806.
To Charles Taylor, M. D. Sec.

A Certificate from Mr. J. Wilkins, carpenter, of Sandy Lane, dated May 4, 1805, stated, that he had used the instrument invented by Mr. J. Broad, for measuring timber standing, and that he believes it to be a correct and valuable one.

The

The Sum of TEN GUINEAS *was this Session voted to Mr.* RICHARD DREW, *of Great Ormond Street, for a* BALANCE LEVEL, *useful for laying out Land for Irrigation, for Roads, and other Purposes.*

The following Communication was received from him; an Engraving is annexed, and the Instrument is placed in the Society's Repository.

SIR,

HEREWITH you will receive a Balance Level, of my invention, which I have satisfactorily used on several gentlemen's estates in Devonshire, where I have been employed to drain and carry water to irrigate meadow land. I have made several for persons in that county, whose employment is to drain and irrigate land, and they have found it to answer their purpose better than the spirit or water level, it being more portable and ready to the sight.

I have lately used it on Mr. Satterley's farm, at Hastings, to carry the water of his closes over several acres of dry ground. Dr. De Salis, who has seen it, advised me to send it to the Society of Arts, &c. that they might judge of its merits.

I am, Sir,
Your obedient Servant,
RICHARD DREW.

London, Dec. 5, 1804.

To the Secretary of the Society
of Arts, &c.

Explanation

Explanation of the Method of using the Instrument.

Set it on a triangular staff, and point it at the object staff, which is held by another person at a distance; move the level on the joint, until the inner tube plays clear within the outer tube. Look through the sights, and observe the object staff which the person holds, let him move the slide on the staff until you see the hair cut the middle of the slide, on which there is a black line, then turn the level round, and look through the sights, you will then see if the hair cuts the middle of the slide as before, which, if it does, it will be level, but if there be a difference in both ends, the person who holds the staff must set the slide to half that difference. You are then to adjust the level by turning with a key the screw which moves the balance contained in the bottom of the inner tube.

Certificates from Mr. J. W. GOOCH, Mr. CHARLES LAYTON, and Mr. BENJ. HOLMES, testify that they have seen in use the level invented by Mr. Richard Drew, and that the business is done by it with accuracy and dispatch.

Reference to the Engraving of Mr. Richard Drew's Balance Level. Plate II, *Fig.* 1, 2, 3, 4.

Fig. 1. The balance level, mounted on a ball and socket joint, with a tube, *a*, to fix on a stand.

Fig. 2. A section, *b b c c* two tubes of tin which slide on a short tube, *d d*, placed in the middle, and having an iron wire soldered round it to stiffen it, and to serve as a shoulder.

e e Two eye pieces, with glass in both, one at each end, and sliding into the tubes *b* and *c*.

f f The balance level, hanging by a sort of staple *g*, on a point fixed upright on the middle of the bar *h* (shown in Fig. 3), which is fastened across the tube *d*.

i i Two eye pieces sliding into the ends of the level *f f*, and having a narrow slit horizontally across the middle, with a hair before each, shown by the dots *h h*.

k An adjusting screw, which acts by drawing the piece *m*, (which moves in a dove-tail slide), in one end of the tube:

n The key-hole through which the screw is turned.

Fig. 4. An end view of the case and level, showing the eye pieces *i* and *e*, one within the other.

The SILVER MEDAL *of the Society was this Session voted to Mrs.* HANNAH D'OYLEY, *of Sion Hill, near Northallerton, Yorkshire, for a new Method of rearing Poultry to Advantage.*

ENGRAVINGS *of the Apparatus are annexed, and the following Accounts were received from her.*

SIR,

I BEG leave to communicate a most desirable method of rearing poultry, which I have proved by experience; the economy and facility with which it may be performed, would, if generally adopted, lower the price of butchers' meat, and thereby be of essential benefit to the community at large. I keep a large stock of poultry, which are regularly fed in a morning upon steamed potatoes chopped small, and at noon they have barley; they are in high condition, tractable, and lay a very great quantity of eggs.

In the poultry yard is a small building, similar to a pigeon cote, for the hens to lay in, with frames covered with net to slide before each nest; the house is dry, light, and well ventilated, kept free from dirt by having the nests and walls white-washed two or three times a year, and the floor covered once a week with fresh ashes: when I wish to procure chickens, I take the opportunity of setting many hens together, confining each to her respective nest; a boy attends morning and evening to let any off that appear restless, and to see that they return to their proper places: when they hatch, the chickens are taken away, and a second lot of eggs allowed them to set again, by which means they produce as numerous a brood as before: I put the chickens into long wicker cages, placed against a hot wall at the back of the kitchen fire, and within them have artificial mothers for the chickens to run under; they are made similar to those described by Monsieur Reaumur, in "his *Art de faire eclore et d'elever en toutes Saisons des Oiseaux domestiques de toutes especes,*" &c. in two volumes, printed at Paris, 1751: they are made of boards about ten inches broad, and fifteen inches long, supported by two feet in the front, four inches in height, and by a board at the back two inches in height. The roof and back are lined with lamb's skins dressed with the wool upon them. The roof is thickly perforated with holes for the heated air to escape; they are formed without bottoms, and have a flannel curtain in front and at the ends for the chickens to run under, which they do apparently by instinct. The cages are kept perfectly dry and clean with sand or moss. The above is a proper size for fifty or sixty new hatched chickens, but as they increase in size, they of course require a larger mother. When they are a week old, and the weather fine, the boy carries them and their artificial mother to the grass-plot, nourishes and keeps them warm, by placing a long narrow tin vessel filled with hot water at the back of the mother, which will retain its heat for three hours, and is then renewed fresh from the steamer. In the evening they are driven into their cages, and resume their station at the hot wall, till they are nearly three weeks old, and able to go into a small room, appropriated to that purpose. The room is furnished with frames similar to the artificial mothers, placed round the floor, and with perches conveniently arranged for them to roost upon.

When I first attempted to bring up poultry in the above way, I lost immense numbers by too great heat and suffocation, owing to the roofs of the mothers not being sufficiently ventilated, and when that evil was remedied, I had another serious one to encounter; I found chickens brought up in this way did not thrive upon the food I gave them, and many of them died, till I thought of getting coarse barley-meal, and steaming it till quite soft: the boy feeds them with this and minced potatoes alternately; he is also employed rolling up pellets of dough, made of coarse wheat flour, which he throws to the chickens to excite them to eat, thereby causing them to grow surprisingly.

I was making the above experiments in the summer for about two months, and during that time my hens produced me upwards of five hundred chickens, four hundred of which I reared fit for the table or market. I used a great many made into pies for the family, and found them cheaper than butchers' meat. Were I situated in the neighbourhood of London, or any very populous place, I am confident I could make an immense profit, by rearing different kinds of poultry in the above method for the markets, and selling them on an average at the price of butchers' meat.

A young person of twelve or fourteen years of age, might bring up in a season some thousands, and by adopting a fence similar to the improved sheep-fold, almost any number might be cheaply reared, and with little trouble. Hens kept as mine are, and having the same conveniences, will readily set four times in a season, and by setting twice each time, they would produce at the lowest calculation, eighty chickens each, which would soon make them very plentiful.

If this information should be so fortunate as to merit the approbation of the Society, I shall consider myself highly honoured, and my time as having been usefully employed.

I am, Sir,
Your most obedient Servant,
HANNAH D'OYLEY.

Sionh-ill, near Northallerton, Nov. 28, 1806.
To CHARLES TAYLOR, M. D. SEC.

SIR,

ACCORDING to your request, I have sent you a model of an artificial mother. The most convenient size for forty or fifty young chickens, is about fifteen inches long, ten deep, four high in front, and two at the back; it is placed in a long wicker cage against a warm wall, the heat at about eighty degrees of Fahrenheit's thermometer, till the chickens are a few days old, and used to the comfort of it, after which time they run under when they want rest, and acquire warmth by crowding together. I find it advisable to have two or three chickens among them of about a week old to teach them to peck and eat. The meat and water is given them in small troughs fixed to the outside of the cage, and a little is strewed along from the artificial mother, as a train to the main deposit. It would have given me great pleasure to have been able to send a specimen of my superior feed and management, if the season had been rather more advanced, for I think it is not possible for turkies and chickens to weigh heavier, be whiter, or altogether better fed than mine are.

After a certain age, they are allowed their liberty, living chiefly on steamed potatoes, and being situated tolerably secure from the depredations of men and foxes, are permitted to roost in trees near the house.

I have the honour to be, Sir,
Your most obedient Servant,
HANNAH D'OYLEY.

Sion-hill, near Northallerton, May 11, 1807.

SIR,

ACCORDING to your request, I herewith send you a rough sketch of the apparatus I use, which probably will convey an idea of the business, and not be too complicated for persons employed in poultry yards, fully to understand; but to prevent trouble and prejudice in the first outset, I think it necessary to remark, that if the chickens do not readily run under the artificial mother for want of some educated ones to teach them, it will be proper to have the curtain in front made of rabbit or hare skin, with the fur side outwards, for the warmth and comfort to attract them, afterwards they run under the flannel ones, similar to the one I sent, which are preferable for common use, on account of cleanliness, and not being liable to get into the mouths of the chickens.

I have had great amusement in rearing poultry in the above way, and if my time was not occupied with my children

Pl. 2.

Mr. Richard Drew's Balance Level.

Fig. 2.

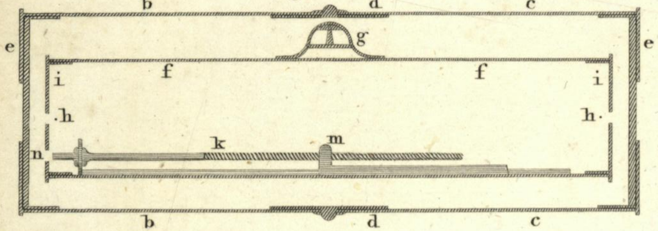


Fig: 1.

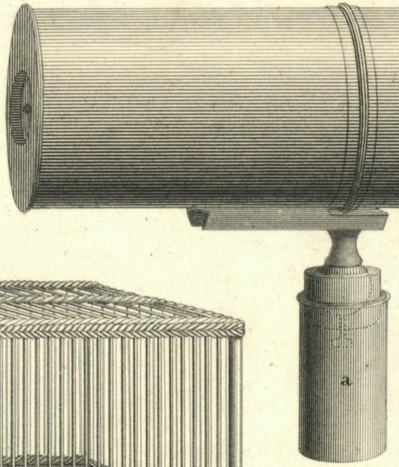


Fig: 4.

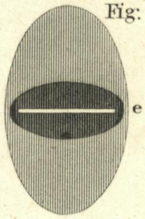


Fig: 3.

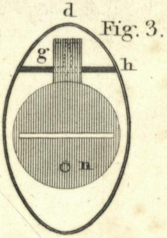


Fig: 7.

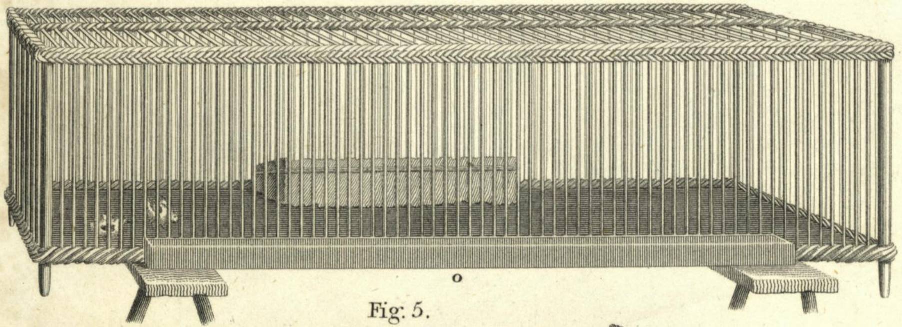


Fig: 5.

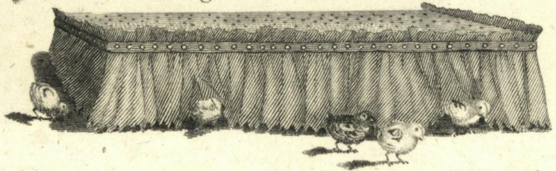
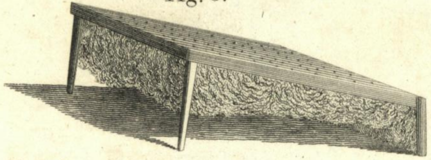


Fig: 6.



Mrs. D'Oyley's Method of rearing Poultry.

C. Varley del.

S. Porter sculp.

dren and other family concerns, I should most assuredly farm very largely in poultry.

I have the honour to be, Sir,
Your most obedient Servant,
HANNAH D'OYLEY.

Sion-hill, May 20, 1807.
To CHARLES TAYLOR, M. D. SEC.

Reference to the ENGRAVINGS *of Mrs. D'Oyley's Method of breeding Poultry.* Plate II. Fig. 5, 6, 7.

Fig. 5. The Apparatus called the Artificial Mother, with a curtain of green baize in front and ends, and holes through the top to allow the circulation of air.

Fig. 6. Another view of the artificial Mother, but without the curtain, in order to show its sloping direction, and interior lining of woolly sheep-skin.

Fig. 7. A wicker basket four feet long, two feet broad, and fourteen inches high, with a lid to open, and a wooden sliding bottom similar to a bird cage: the Artificial Mother is shown, as placed within it.

O. A Trough in front to hold food for the Chickens.

The SILVER MEDAL *of the Society was this Session voted to Major* SPENCER COCHRANE, *of Muirfield House, near Haddington, North Britain, for the Culture of Spring Wheat, and the Use of Tincture of Opium in the Diseases of Cattle.*

On Spring Wheat.

SIR,

I REQUEST the favour that you will present my thanks to the Society of Arts, &c. for transmitting me the 20th volume of their Transactions, containing my former experiments on the culture of wheat sown in the spring. I have since had further proofs of the advantage resulting from that practice.

Notwithstanding the extreme cold weather, which we had here during the months of March, April, and May, I never saw my spring wheat look better, particularly four acres, part of a field of strong clay, which I was prevented from sowing in October, when I sowed my other wheat, by wet weather commencing.

The whole field consists of twenty acres, and received one ploughing after drilled beans. I sowed on the 14th of March the four acres, with four bolls or two quarters of common wheat, on the same earth or furrow which the land got in the month of October.

In the event of land having been fallowed and sufficiently cleaned before winter, and wet weather setting in so as to prevent wheat being sown at the usual time, I recommend from experience that the wheat be sown in the spring on the winter furrow, and that it should by no means be ploughed again in the spring.

The winter frost meliorates the soil, and I think kills the annual weeds. I have remarked that by adopting this mode, the land is much less troubled with them, the weeds having been a general objection to spring wheat.

If spring wheat follows turnips, the ground should be ploughed as soon as possible, if the soil is of a wet nature, to correct the injury the land may have sustained by leading off the crop, and by the poaching of carts and horses. Frost will in some degree correct what should never if possible happen, *wet ploughing*.

From the middle of February till the 10th of March is the proper time for sowing wheat in the spring, provided the land is sufficiently dry. Then on the first furrow let the seed properly pickled be sown either by drill or broad cast, the usual practice of water furrowing, to keep the land from too much rain, being properly attended to.

On the Use of Tar for Cattle swelled by eating Clover.

Cows are frequently seized with violent swellings from having been imprudently allowed to eat clover when wet. A gentleman recommended to me, as a cure, an egg-shell full of tar, immediately to be put down the creature's throat. In two instances of my own cattle I found it had the effect of laying the swelling in a few minutes. A neighbour of mine whose cow was supposed could not live five minutes, was, on application of the tar, unexpectedly recovered, to the great joy of the poor man.

On Opium and other Preparations from Poppies.

After I commenced farmer, I unfortunately lost four horses, by a disorder, very frequent in this country, called the *bats* or *gripes*; some of them died in a few hours, and none of them were ill more than two days. For some years past I have given my horses in such cases a table spoonful of tincture of opium, or liquid laudanum, and have since lost none. If the first dose given in some liquid does not allay the violent pain and swelling, I administer a second spoonful, which I have hitherto, in all cases, found to have the desired effect, and generally in a very short time.

If I find the horse very hot and feverish, and sweating profusely, as is usually the case in this disease, I order him to be bled plentifully, and an ounce or more of nitre to be mixed, and administered with the laudanum, keeping the horse warm, and letting him be well rubbed round the belly.

A very considerable farmer near me, who has had a medical education, told me, a few days ago, that he had not lost a horse since he gave them laudanum.

Ten days ago I was equally fortunate in a trial of it on one of my sheep, which, half an hour after being washed with the rest of the flock, was taken so extremely ill, and swelled so much, that my herdsman supposed she could not live, having lost some of his own, which had apparently been in the same state. I immediately ordered half a handful of common salt to be dissolved in half an English pint of warm water, into which I put sixty drops of the laudanum, and poured it with difficulty down the animal's throat, which seemed nearly dead. For the first five minutes I had so little hopes of the sheep's recovery, that I ordered the man to get his knife ready to cut her throat; whilst he sharpened the instrument for such purpose, he observed the animal to move its jaw to a proper position, which had previously been much distorted; the eyes then began to quicken, and apparently to become at ease. In half an hour afterwards the sheep got on her legs, and remained standing for some time; a plentiful evacution soon took place, the swelling subsided, she continued to recover, and in a few hours from the first attack began to eat and do well.

My intent in these communications is to render generally public what I have found so very beneficial. At this time, when horses and cattle are so extremely high in price, every thing that can tend to preserve their lives, should be made known and put to trial.

I formerly noticed to you, that I had tried on a small scale, for several years, the culture of white poppies to prepare opium from them, and an extract or syrup of poppies; that I had raised a sufficient supply for myself and friends, and that my extract was equal in effect to any prepared from foreign opium. I recommend the poppy seeds to be sown in March, in drills.

Besides the advantages from the poppy heads as a medicine, the seeds yield a valuable oil. Two pounds of the seeds furnish by expression seven ounces of a pure bland oil, useful for portrait painting and other purposes. It has been proved in Holland to be equal in quality to fine salad or olive oil, and it would probably be advantageous to propagate largely so valuable a plant.

I am, Sir,
Your humble Servant,
SPENCER COCHRANE.

Muirfield House.

To C. TAYLOR, M. D. SEC.

SIR,

SINCE my former communication I have had frequent opportunities of being fully convinced of the efficacy of laudanum, when applied in proper time, for the cure of the cholic in horses. When inflammation has taken place, which sometimes comes on very rapidly, its application will be too late. A few days since two of my draught horses were taken ill, one in the morning, the other in the evening. I believe the disorder originated from their having been allowed to drink too much water when warm. By using the laudanum in the manner I have recommended they both recovered, and were at their work again within twenty-four hours. I grow the poppy, extract the opium from the heads, infuse it in spirits or brandy agreeably to the pre-

scription

scription in the Dispensatory, and thus prepare the laudanum myself, instead of purchasing it at the apothecary's. I consider my opium to be pure and unadulterated, and of course stronger, and more efficacious.

I have cured many persons of colds and coughs of long standing, by the following preparation or syrup.

Take half a pound of the heads of the large white poppy without any of the seeds, the heads just ripe and moderately dried, put them into three quarts of boiling water, let them boil gently, till the liquor is reduced to one quart, squeeze the poppies well in a cloth to strain out the liquor, boil the liquor again slowly to one pint and strain it, then add to it a pint of white wine vinegar, and one pound of raw sugar, let them boil gently to the consistence of a syrup, then add thereto spirit or elixir of vitriol to make it gratefully acid. The dose I have recommended for adults is one or two tea-spoonfuls, but never exceeding three, on going to bed. If the cough continues violent, two more may be taken the following morning. One dose sometimes cures, two generally, and I have never had occasion to employ it more than thrice. For young children one tea-spoonful is sufficient.

I recommended the use of this medicine to a surgeon in Haddington, and he told me it answered beyond his expectation.

I am, Sir,
Your obedient Servant.
SPENCER COCHRANE.

Muirfield, near Haddington, May 7, 1807.

To C. TAYLOR, M. D. SEC.